

I-77 Feasibility Study (I-85 to Griffith Street)

TIP Project No. FS-0810B

**Task Order No. 3 – Use of I-77 Shoulders for Travel Lanes
Sub-task 3.B, Performance Measures**

TECHNICAL MEMORANDUM

(FINAL)

October 20, 2009

1.0 INTRODUCTION

This sub-task under Task Order 3 involves a review of the performance measures used by transportation agencies in other locations to monitor the effectiveness of permitting traffic to operate along freeway shoulders.

Section 2.0 describes possible objectives associated with converting a shoulder to full-time or part-time operation.

Section 3.0 provides the evaluation framework for measures of effectiveness and data sources to be used in assessing the benefits of allowing traffic to operate along I-77 shoulders.

2.0 PROPOSED OBJECTIVES

The objectives of this approach are to allow general purpose traffic to use I-77 shoulders on a part-time (peak direction, peak period only) or full-time basis. They could include:

- Reduce traffic congestion which, according to NCDOT standards, is traffic flowing at speeds below 40 miles per hour.
- Reduce travel time for all I-77 users.
- Operate a safe shoulder facility and preserve the safety of the I-77 general-purpose lanes.
- Maintain an incident clearance time comparable to previous years and the County-wide average for interstate highways.
- Test public acceptance of shoulder conversion to general purpose lanes.

The aforementioned objectives are consistent with those used recently by the Minnesota Department of Transportation (MnDOT) to monitor operations along I-94 in Minneapolis when this freeway's shoulders were converted to traffic lanes. This traffic mitigation project was implemented to handle vehicles re-routed from the collapsed I-35W bridge.

3.0 PROPOSED MEASURES OF EFFECTIVENESS

In order to assess the objectives quantitatively, measures of effectiveness (MOEs) are applied based on available traffic and design data and forecasted operation and design conditions.

Planning level data associated with an I-77 shoulder operations would include:

- **Design** – Ability to convert a shoulder to a general purpose lane, ability for the design to permit incident response, and costs and impacts associated with the shoulder conversion.
- **Operations** – Forecast changes in congestion, travel time and speed for shoulder users and general purpose traffic.
- **Safety** – Comparison of various operational and design attributes that can influence safe operation, ability to respond to incidents, based on current and proposed concepts.
- **Agency and Public Attitudes** – Public perceptions of what would constitute project success. This would include results of affected federal, state and local agencies, focus group interviews and citizen surveys, phone calls, internet email comments, etc.

Table 1 provides a list of MOEs which will be applied to each objective using available data sources.

Table 1: Matrix of Shoulder Conversion Objectives, MOEs and Data Sources

Objective	Measures of Effectiveness (MOEs)	Data Source
Ability of design to accommodate shoulder operation	Review of current design, pavement condition, costs to modify	Corridor as-built plans, field data, cost estimate data for ITS and unit quantities.
Reduce congestion	Travel demand and speeds	Forecasted shoulder lane and general purpose lane demand; travel speeds in peak hours
Reduce travel time	Comparative forecast travel times	Forecasted shoulder lane and general purpose lane travel times for peak hour
Operate a safe facility	Ability to provide emergency pull-out refuge areas	Corridor as-built plans compared to concept plans to convert shoulder to general purpose lane
	Transitions at termini-impacts to general purpose traffic	Shoulder and general purpose forecasted demand and weaves created by conversion concept
	Crossover conflicts at ramps	Number and level of crossover demand
	Traffic control device requirements	Comparative cost among concepts versus "do-nothing" alternative
	Design exceptions	Comparison of corridor as-built plans to concept plans to convert shoulder to general purpose lane
	Ability to maintain left side shoulder for emergency breakdowns and emergency vehicle access	Comparison of concepts
	Costs and environmental impacts	Cost estimates and identified environmental issues
	Crashes, crash rate & injury severity	Law enforcement DMV 349 reports and Mobility & Safety's Traffic Safety Systems Section
Maintain acceptable incident clearance times	Incident frequency	Incident logs, TIMS & law enforcement records for existing determination. This rate is compared with future demand (extrapolated forward using number of anticipated minor/major incidents per million vehicle miles forecast)
Agency and public support	Agency attitudes	Feedback from Mecklenburg Traffic Incident Management Team; focus groups and one-on-one interviews
	Public attitudes	Citizen focus groups; telephone or web surveys